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Noguchi et al.

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(54) **NEEDLE THREAD PASSING DEVICE**

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(73) Assignees: **Kotobuki & Co., Ltd.**, Kawagoe-Shi, Saitama (JP); **Westek International Corporation**, Tokyo (JP)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 886 days.

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D05B 87/00 (2006.01)

(52) **U.S. Cl.**
USPC **112/224**

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USPC 112/224, 225, 226, 227, 302; 223/1, 99
See application file for complete search history.

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(57) **ABSTRACT**

A needle thread passing device is capable of being constructed in a small size for easy storage.
A needle receiving member **34** has a needle insertion hole **34***c* and a thread insertion slit **34***e* forming an angle with the needle insertion hole **34***c*. A needle threader member **42** is movable between positions away from and close to the needle receiving member **34** and has a needle threader pin **48***b* that can push a thread inserted through the thread insertion slit **34***e* into a needle eye **52***a* of a needle **52** inserted into the needle insertion hole **34***c* when the needle threader member **42** moves from the position away from the needle receiving member **34** to position close thereto. A cover **32** can move with respect to a main body **30** containing the needle receiving member **34**. The needle threader member **42** is constantly biased toward the position away from the needle receiving member **34**. The cover **32** can move between a locking position at which the needle threader member **42** is locked to the position close to the needle receiving member **34** and an allowable position at which the needle threader member is allowed to move between the positions away from and close to the needle receiving member. At the storage time, the cover is located at the locking position.

20 Claims, 17 Drawing Sheets

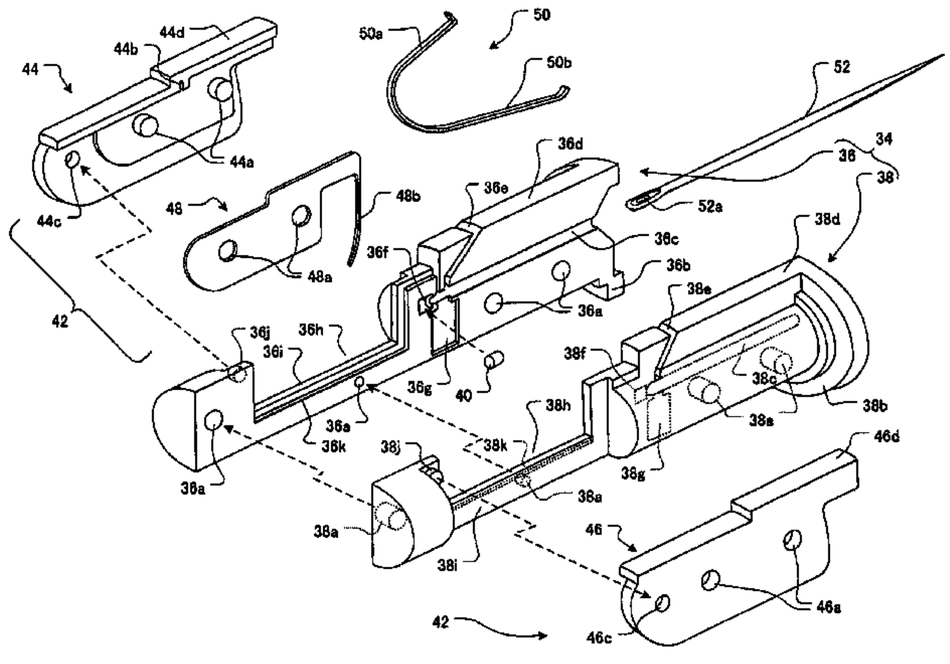

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Fig. 1

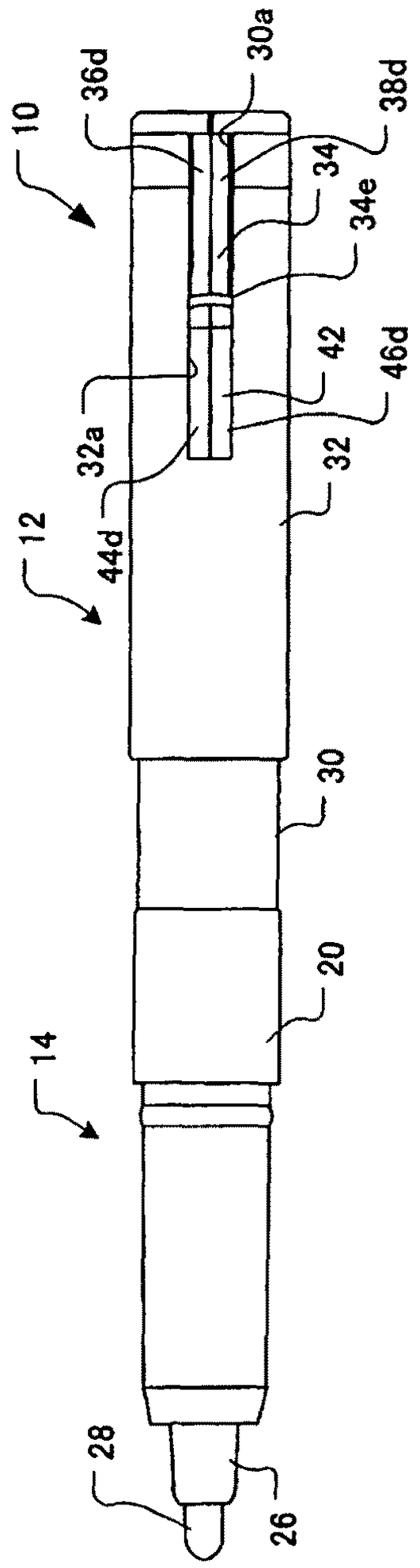
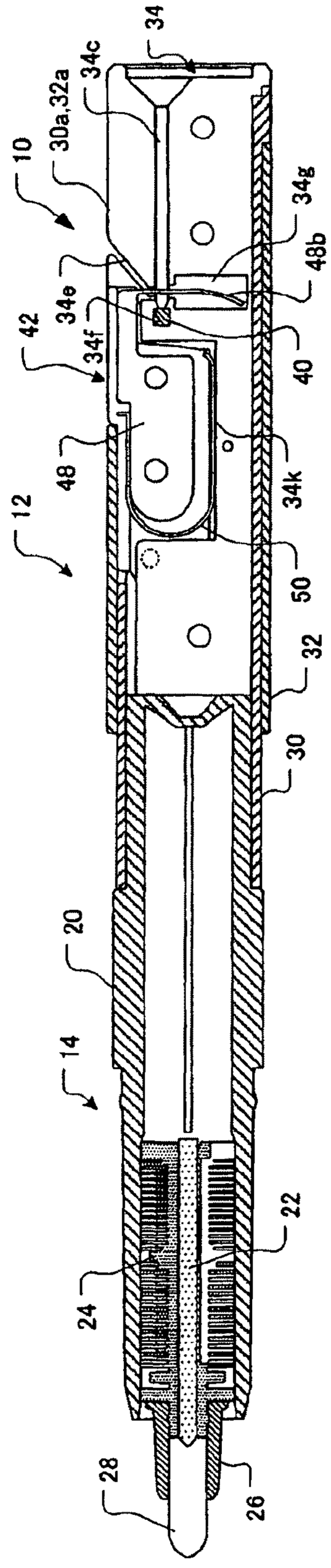


Fig. 2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34g
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20
14
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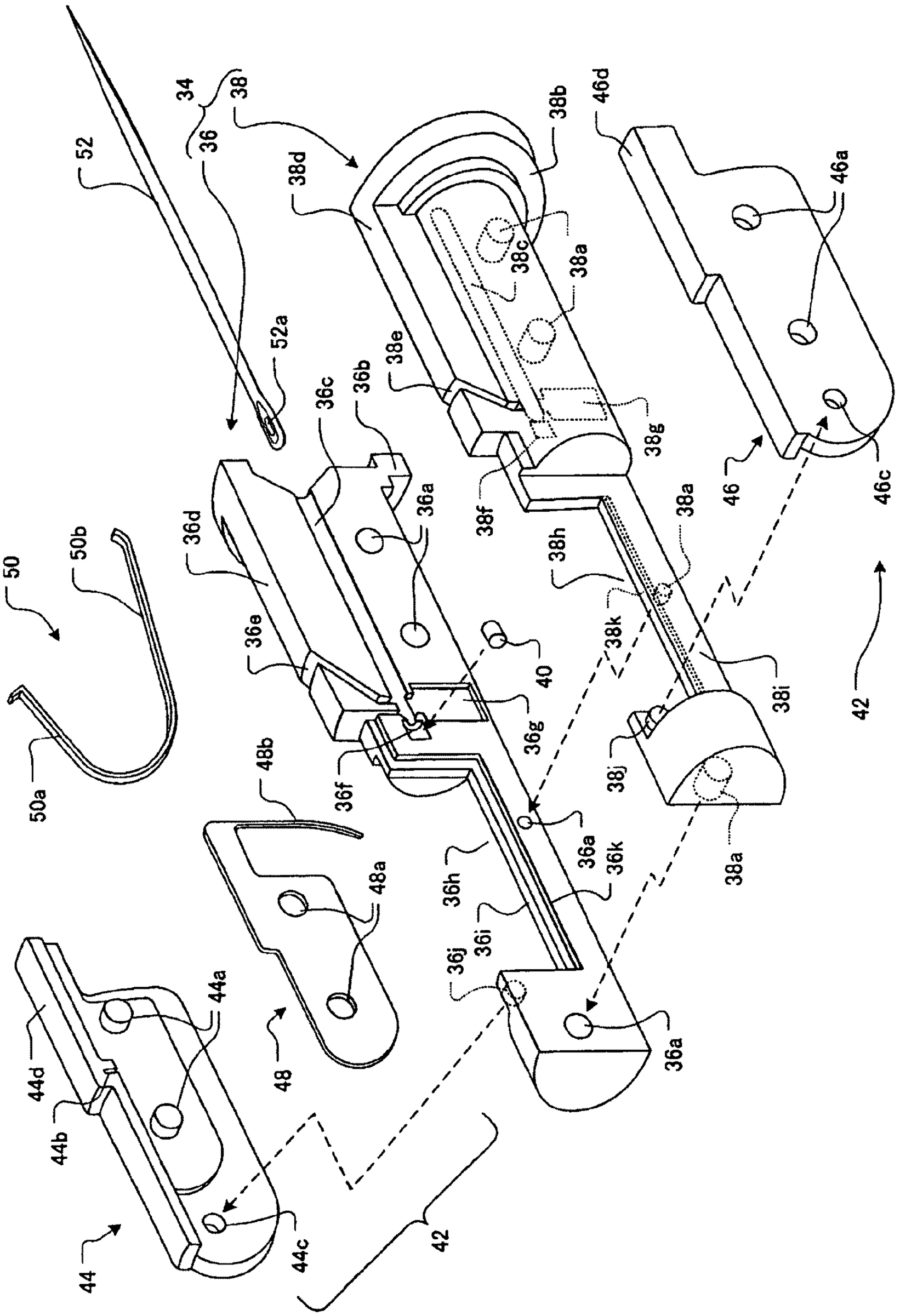
24
28
26

Fig. 3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38a
46
46c
50
50b
50a
36d
36a
36e
40
38k
38i
42
48b
36f
36g
38j
48a
36h
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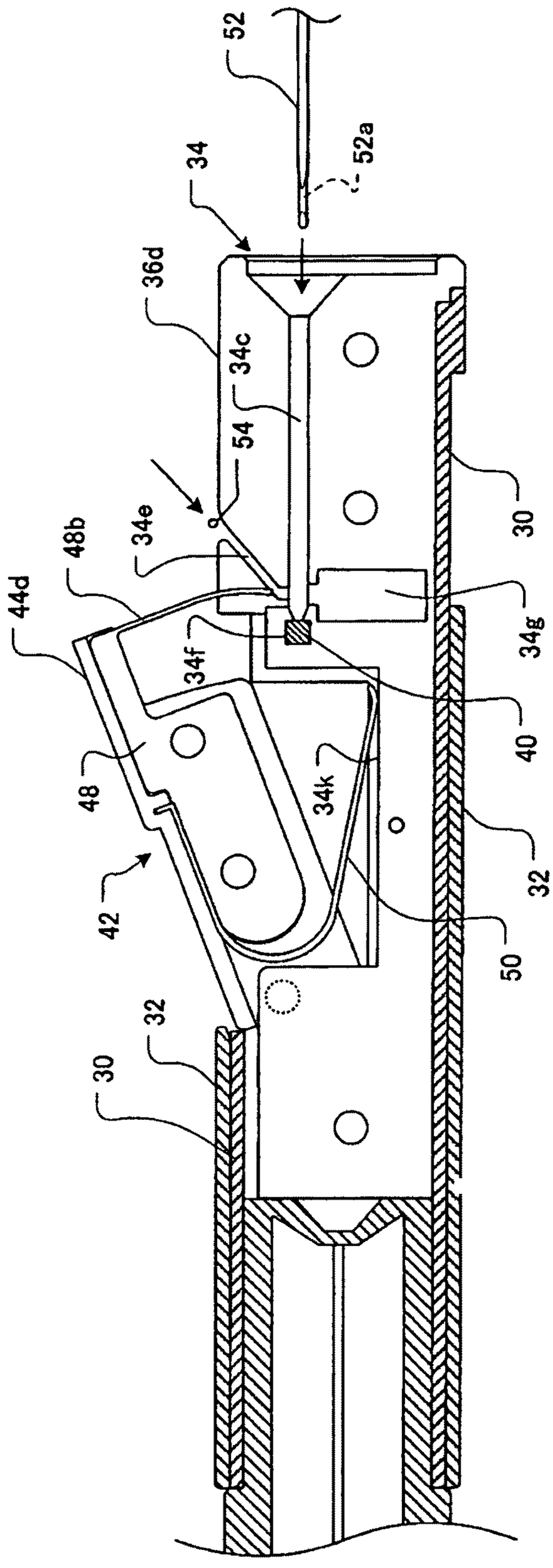
38a
36i
36j
44a
44d
44b
48
44
44c
42
36a

Fig. 4



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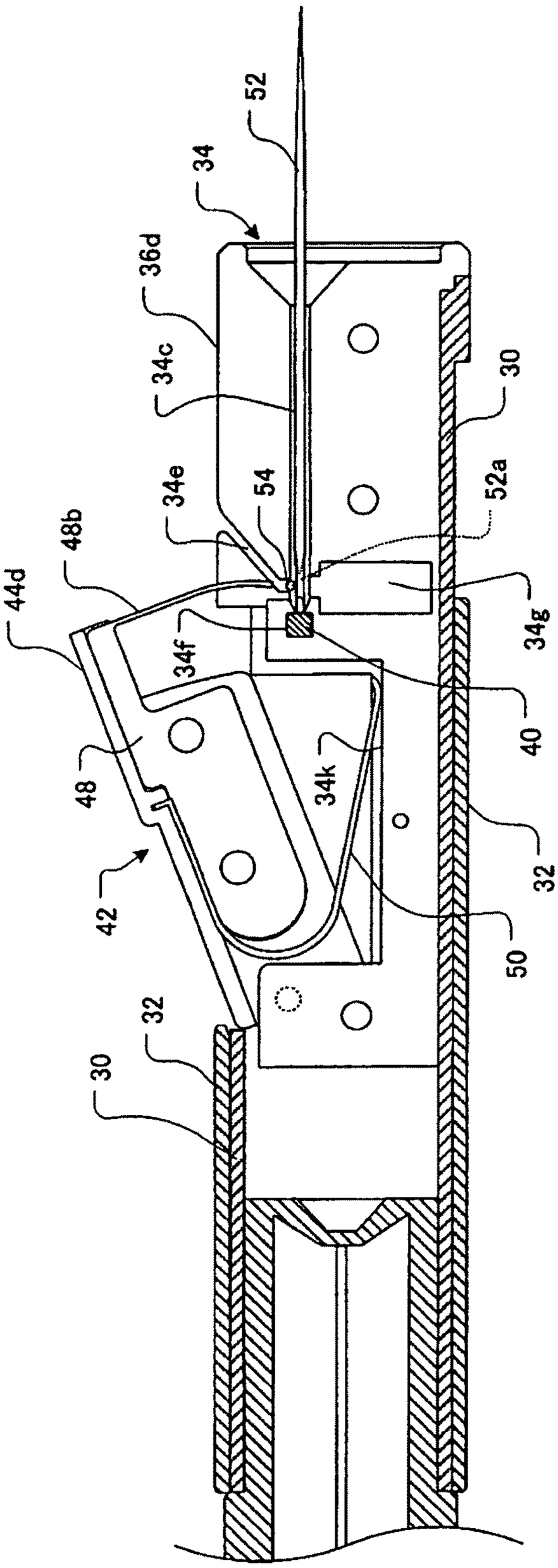

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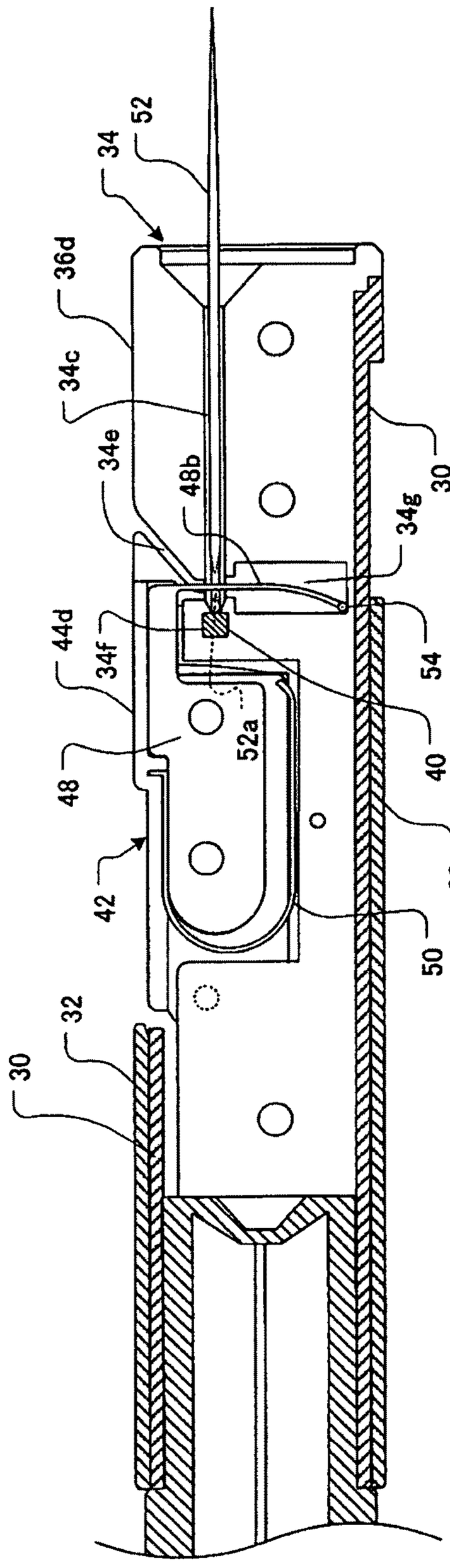


Fig. 7

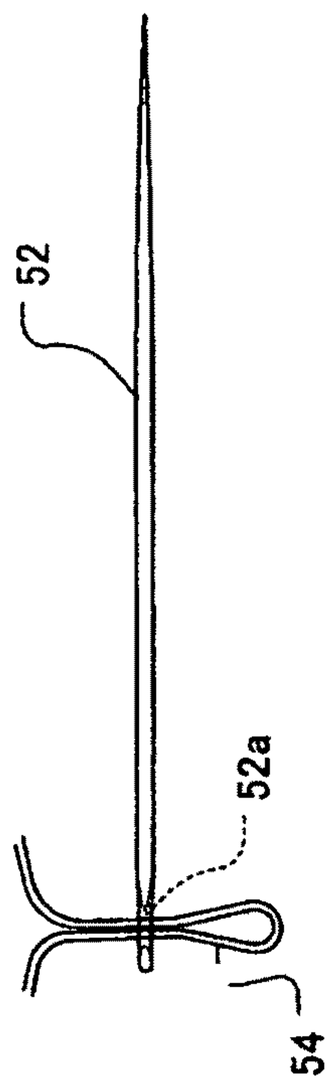


Fig. 8

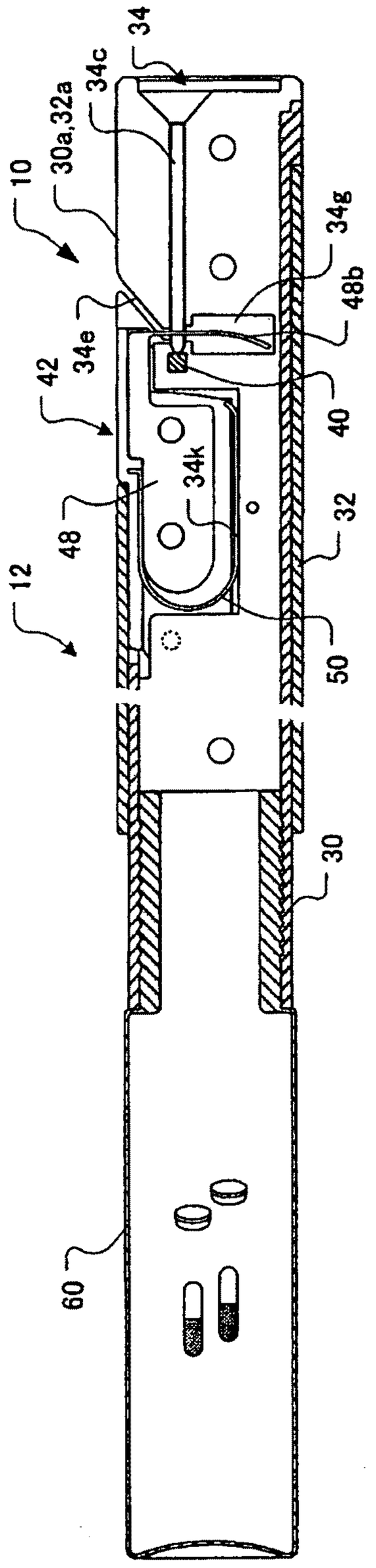
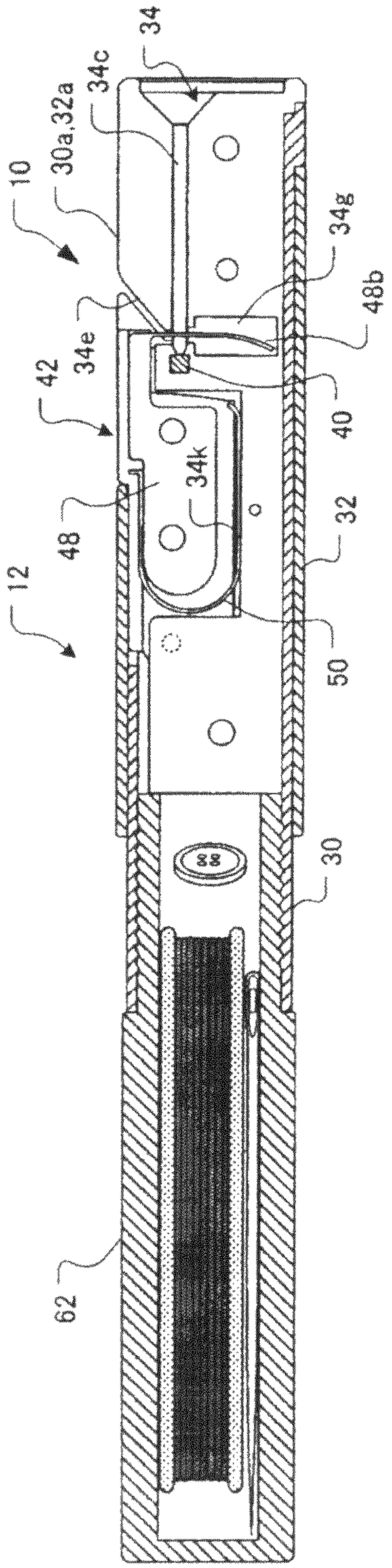


Fig. 9



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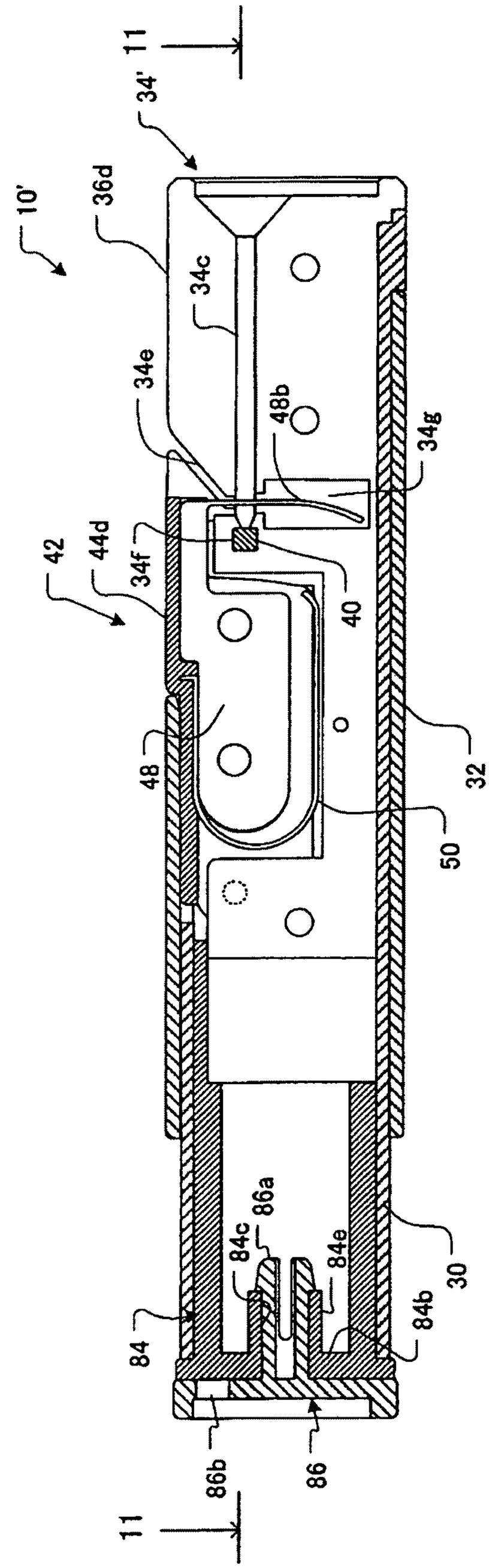
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84b
84
86b
86
11

Fig. 11

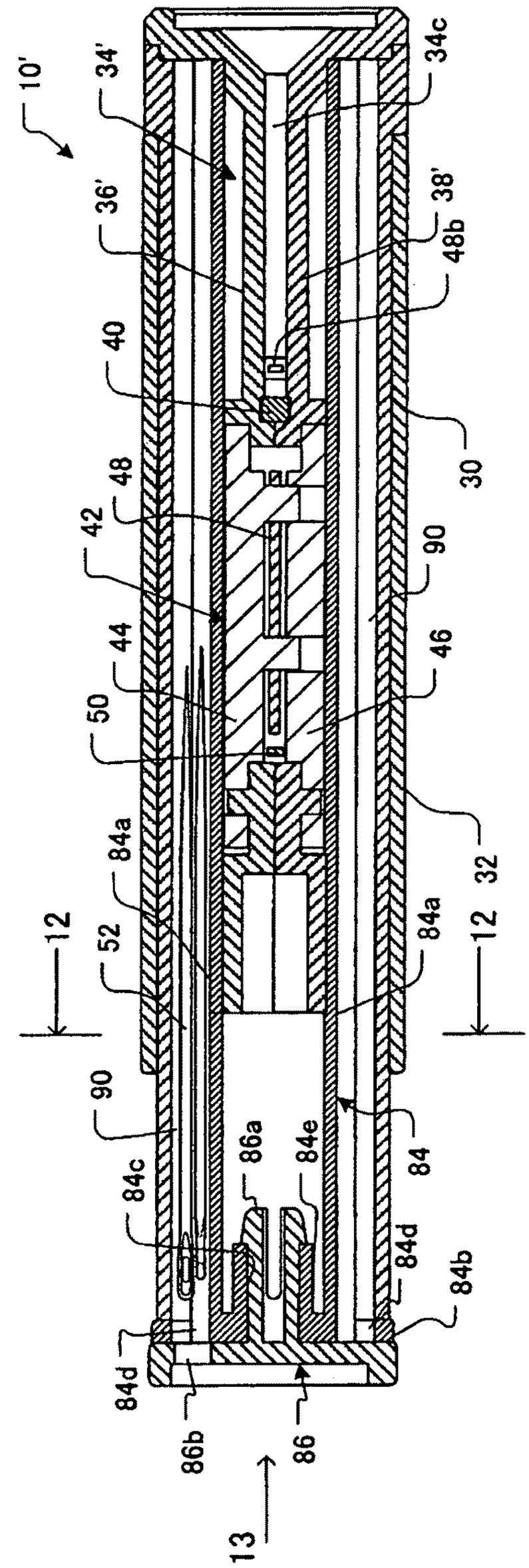
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Fig. 12

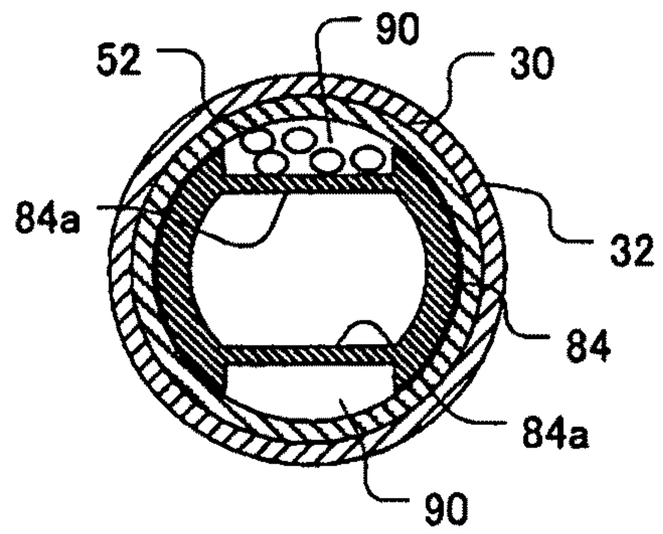


Fig. 13

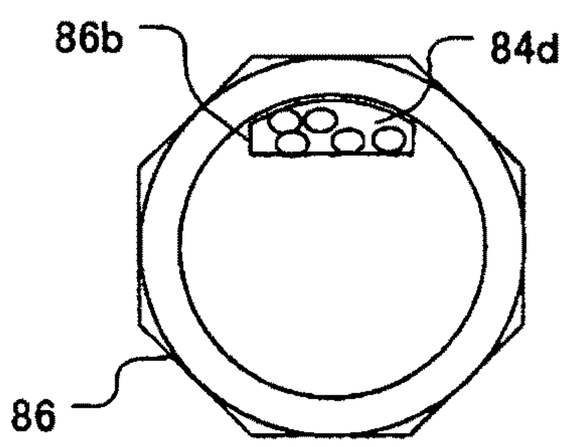
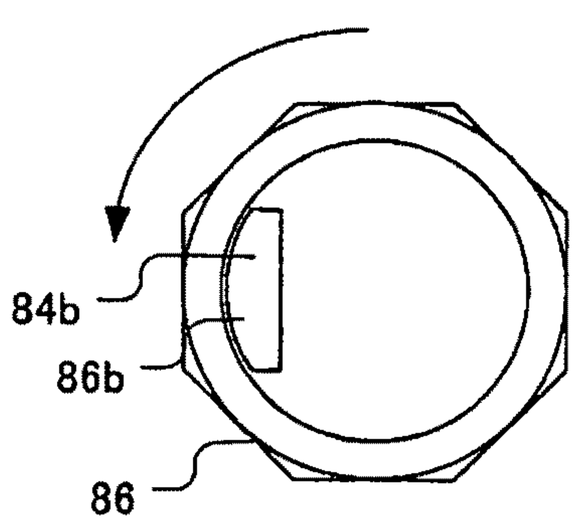


Fig. 14



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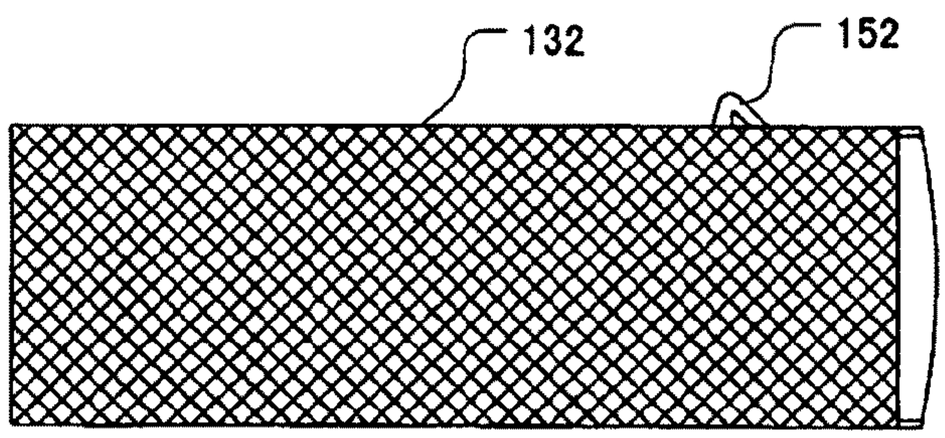
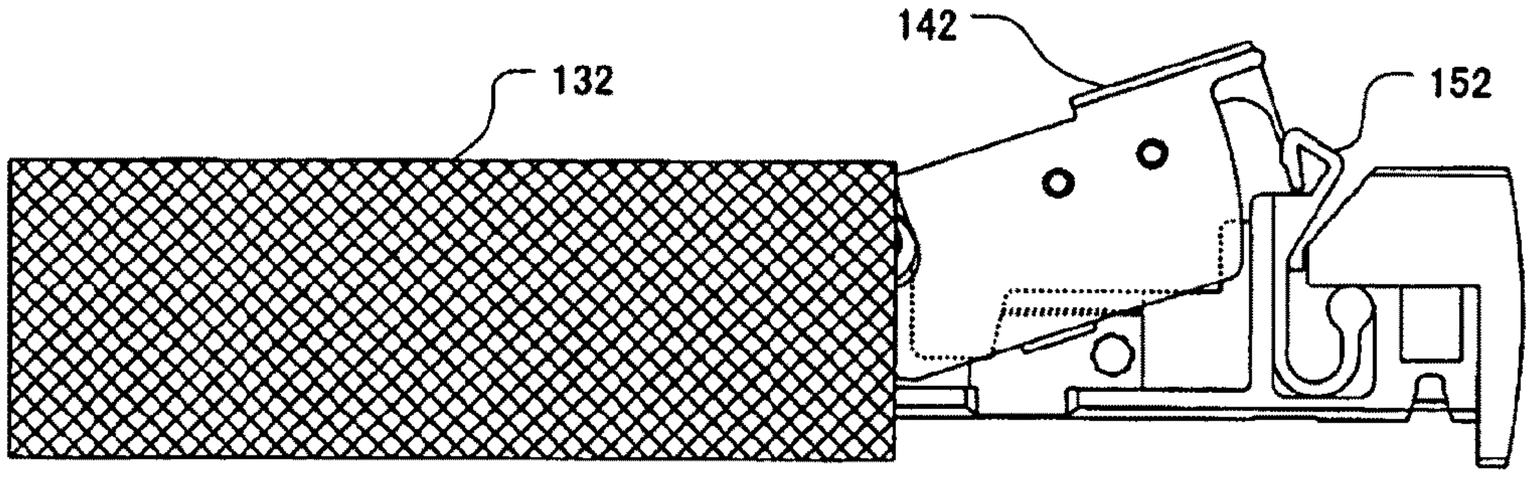


Fig. 16



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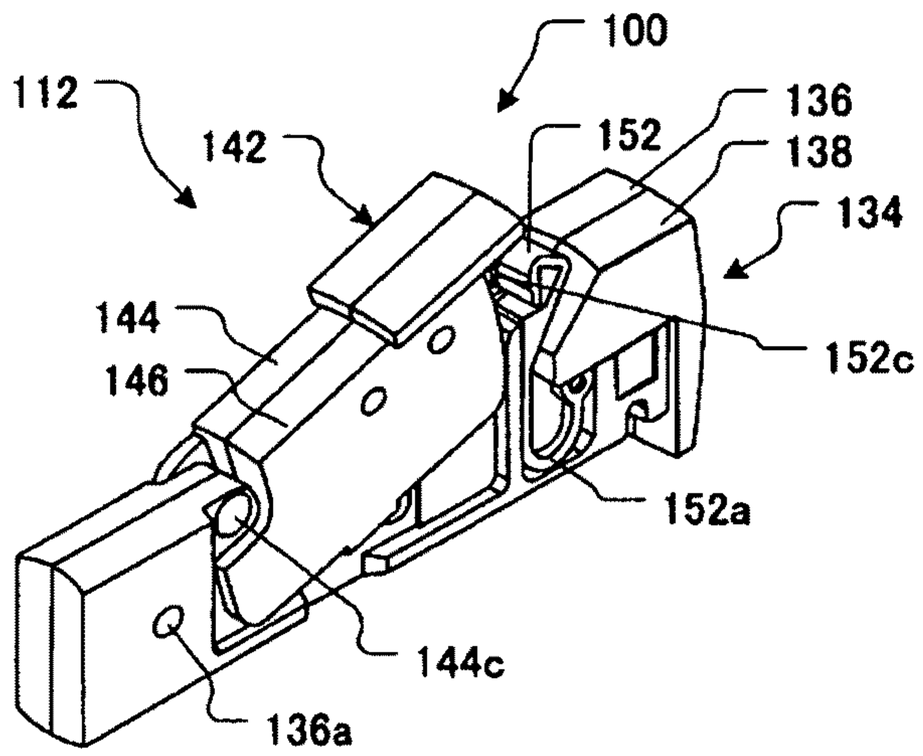

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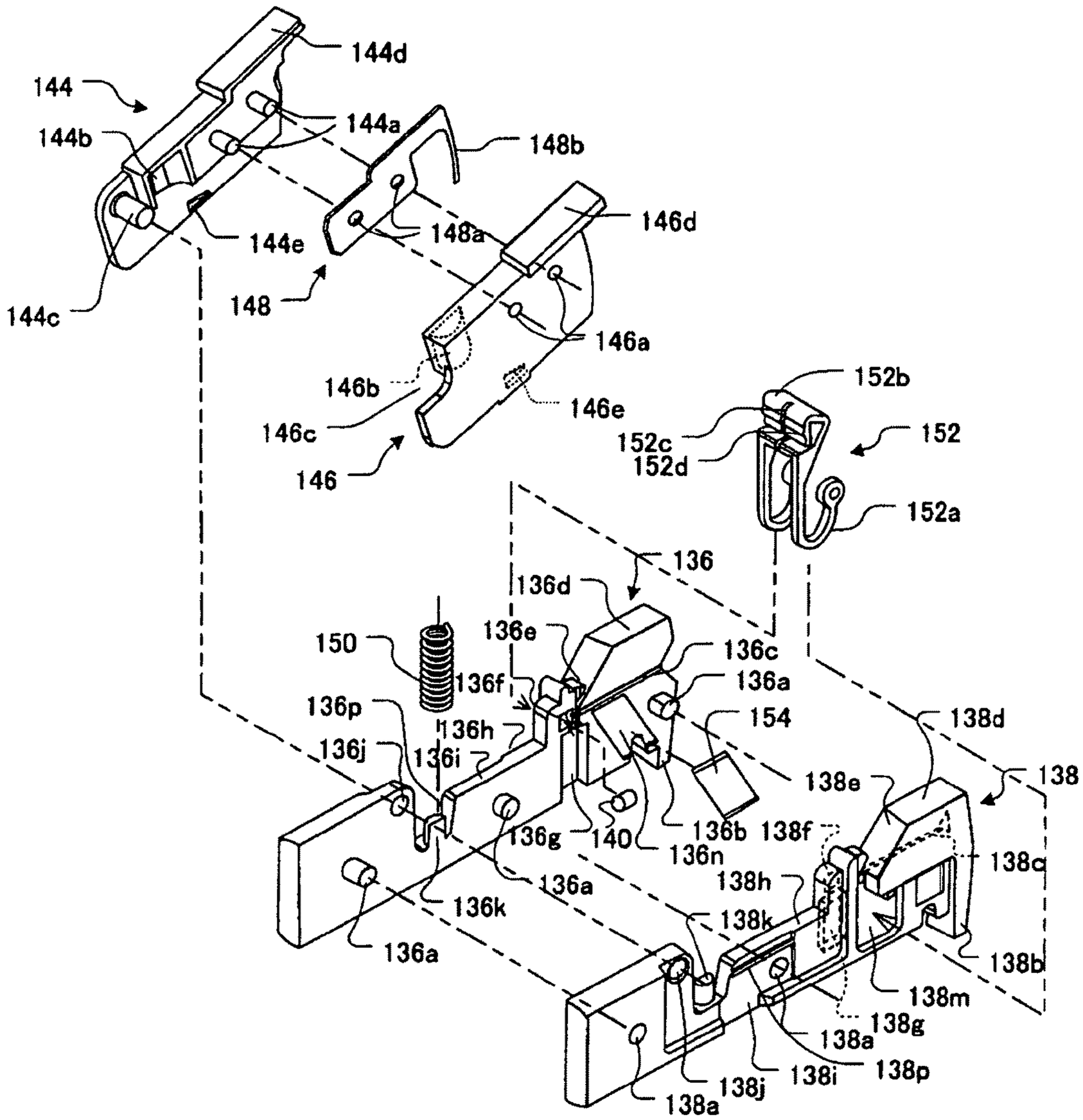
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152d
152a
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136e
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136c
136f
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136p
154
138d
136h
136j
136i
138e
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136g
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Fig. 19

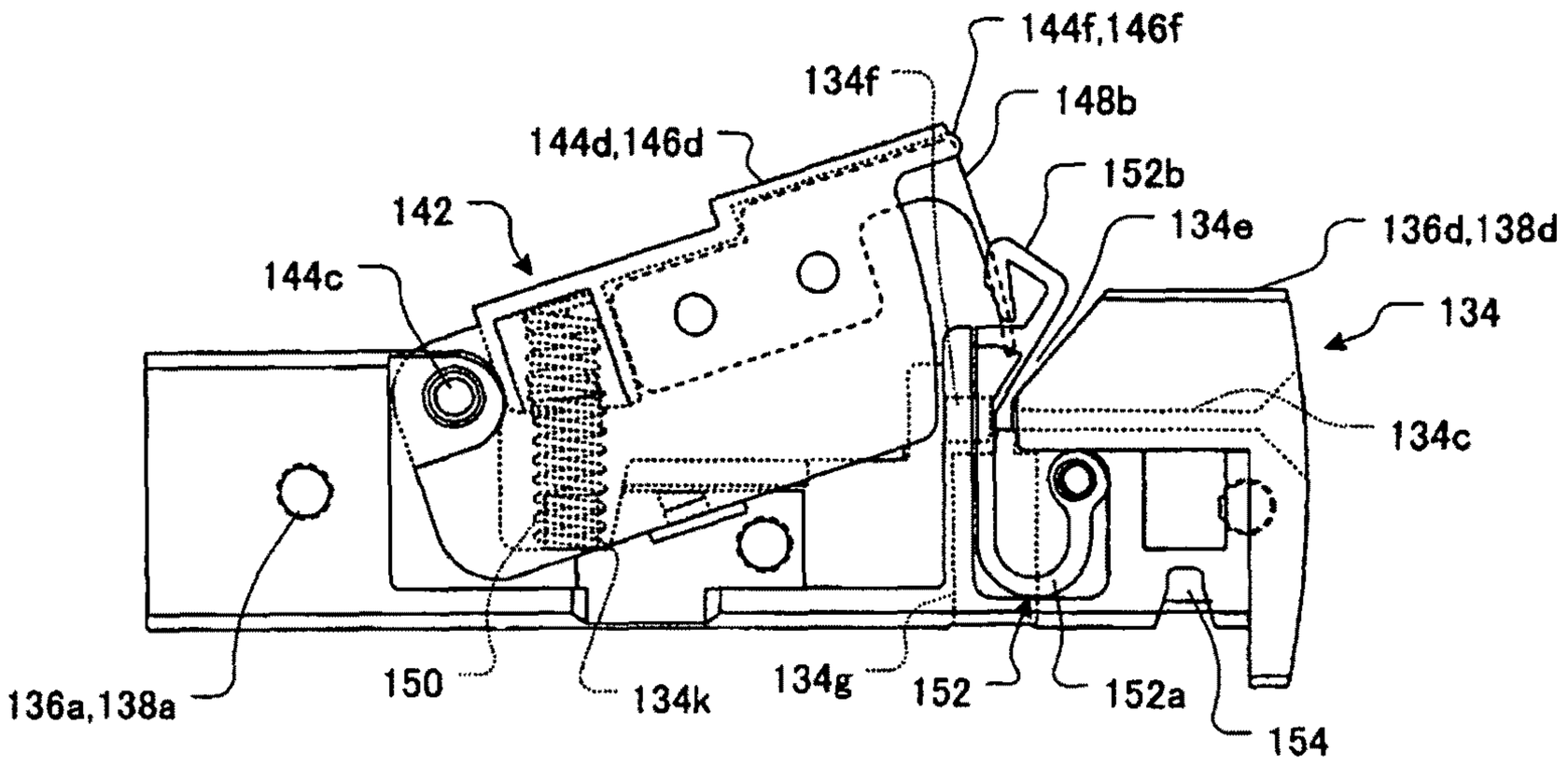
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Fig. 20

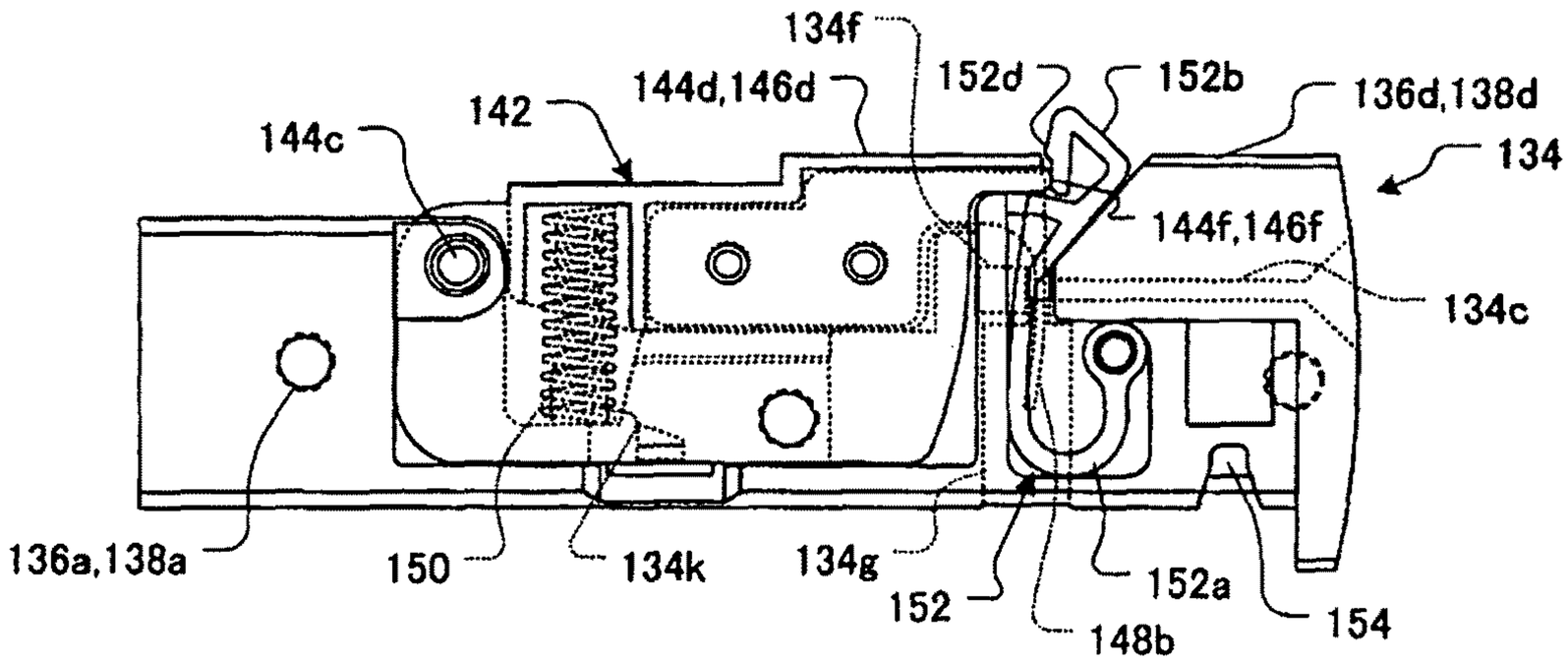
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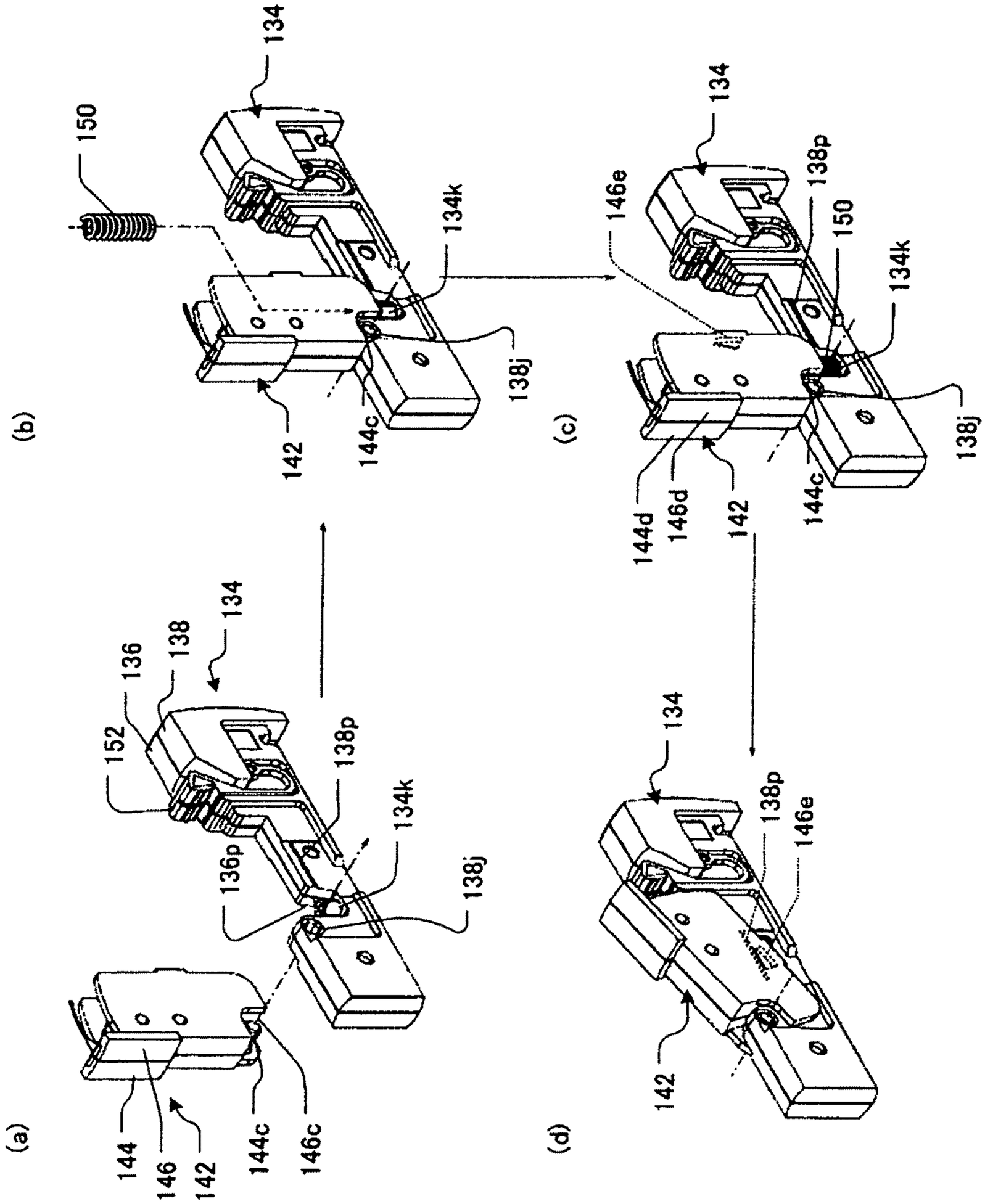
Fig. 21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(b)
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134k
138j
(c)
144d
146d
142
144c
146e
138p
150
134k
138j
134
(d)
142
138p
146e
134

NEEDLE THREAD PASSING DEVICE

TECHNICAL FIELD

The present invention relates to a needle thread passing device for facilitating insertion of an end of a thread in the eye of a needle.

BACKGROUND ART

As a needle thread passing device of such a type, one disclosed in Patent Documents 1 (Japanese Patent No. 3,315,364) is known. In this needle thread passing device, a needle insertion cylinder having a bottomed needle insertion hole is placed upright on a main body having a pedestal surface, and a thread passing hole to be communicated with a needle eye of an inserted needle is formed in a lower portion of the needle insertion cylinder in a direction crossing the needle insertion hole. A thread placement portion is formed near the entrance of the thread passing hole, and a thread locking piece is provided at an operating member provided in the main body. The thread locking piece is configured to be freely inserted into and removed from the thread passing hole through the operating member by a pressing force of a pressing member provided in the main body. In this configuration, a needle is inserted into the needle insertion hole of the needle insertion cylinder, a thread is set at the thread placement portion, and the pressing member is pressed. Then, the operating member is swung. As a result, the thread locking piece provided in the operating member pulls the thread set at the thread placement portion into the thread passing hole, whereby the thread is inserted into the needle eye. When the pressing force of the pressing member is released, the operating member swung back by a spring to its original position. As a result, the thread is passed through the needle eye.

Patent Documents 1: Japanese Patent No. 3315364

SUMMARY OF THE INVENTION

Technical Problem

However, in the needle thread passing device of Japanese Patent No. 3,315,364, a space for the operating member to swing is provided in the main body and thereby the size of the main body is increased. As a result, the apparatus takes up much space, leading to inconvenience for storage.

The present invention has been made in view of the above problem, and an object thereof is to provide a needle thread passing device capable of being constructed in a small size for easy storage.

Solution to Problem

To attain the above object, according to an aspect of the present invention, there is provided a needle thread passing device including a needle receiving member formed with a needle insertion hole and a thread insertion slit forming an angle with the needle insertion hole, a needle threader member that is movable between positions away from and close to the needle receiving member and has a needle threader pin that can push a thread inserted through the thread insertion slit into an eye of a needle inserted into the needle insertion hole when the needle threader member moves from the position away from the needle receiving member to position close thereto, and a changeover member that can move with respect to the needle receiving member. The needle threader member is constantly biased toward the position away from the needle receiving member, and the changeover member can move between a locking position at which the needle threader member is locked to the position close to the needle receiving member and an allowable position at which the needle threader member is allowed to move between the positions away from and close to the needle receiving member.

When the changeover member is located at the locking position, the needle threader member is locked at a position close to the needle receiving member, so that at the time of nonuse, the needle thread passing device can be made in a compact form for easy storage. At the time of use, the changeover member is moved to the allowable position so as to allow movement of the needle threader member. Thus, the needle threader member can automatically move to the position away from the needle receiving member by the biasing force. After a needle and thread are inserted into the needle insertion hole and thread insertion slit, respectively, the needle threader member is moved against the biasing force, thereby allowing the thread to be pushed into a needle eye by the needle threader pin. Thus, the needle threader member is made movable only at the time of use, and the needle thread passing device can be made in a compact form at the time of nonuse.

The needle threader member can swing so as to allow the tip end thereof to move between the positions away from and close to the needle receiving member, and the changeover member can comprise a cover that covers at least a part of the needle threader member at the locking position.

When the cover covers at least a part of the swingable needle threader member, the swing of the needle threader member can be disabled.

The needle receiving member can be arranged in a cylindrical main body, the changeover member can be slid on the outside of the main body, and at least a part of the needle threader member can be arranged in the main body when located at the position close to the needle receiving member.

Since at least a part of the needle receiving member and the needle threader member can be housed in the cylindrical main body at the time of nonuse, the needle thread passing device can be in made in a compact form, achieving easier storage.

A housing space may be formed between the main body and the needle receiving member.

Since the housing space can be formed between the main body and the needle receiving member, a needle thread passing device can provide high space efficiency and excellent storage capability.

A magnet may be arranged at the end portion of the needle insertion hole. Because a needle that has been inserted into the needle insertion hole is attracted by the magnet, the needle can be fixed in place, thereby preventing dropping of the needle.

The thread insertion slit may extend from the outside surface of the needle receiving member in the direction inclined with respect to the needle insertion hole, and then may extend toward the needle insertion hole in the direction perpendicular to the needle insertion hole.

Because the thread insertion slit extends in the direction perpendicular to the needle insertion hole at a position close to the needle insertion hole, it is sufficient for the thread inserted through the thread insertion slit to reach the portion extending in the direction perpendicular to the needle insertion hole in order for the thread to be pushed into the needle eye by the needle threader pin.

The needle thread passing device may be constructed by integrating a needle thread passing unit including the needle receiving member, the needle threader member, and the

changeover member and a unit having a different function from that of the needle thread passing unit.

The size of the needle thread passing device can be reduced, so that it is possible to realize a needle thread passing device by integrating the needle thread passing unit with another unit having a different function from that of the needle thread passing unit.

The needle receiving member may further comprise a protecting member for guiding the movement of the needle threader pin. It can prevent the thin needle threader pin from being broken or bent when the needle threader member is inserted into the needle hole as the needle threader member can move from the position away from the needle receiving member to the position close thereto.

The protecting member may be deformable while the needle threader member approaches the needle receiving member so as to allow approach of the needle threader member. Due to deformation of the protecting member, the interference of the protecting member for guiding the movement of the needle threader pin can be prevented at when the needle threader member approaches the needle receiving member.

A notifying means for generating a sound or friction force may be provided between the needle receiving member and the needle threader member, which is produced while the needle threader pin of the needle threader member is passing through the needle insertion hole. The user of may recognize the completion of the movement operation of the needle threader member by the notifying means.

The needle threader member comprises a pair of needle threader supporting parts and a needle threader part including the needle threader pin arranged between the threader supporting parts. One of the needle threader supporting parts may include an axis pivotally supported by the needle receiving member and the other of the needle threader supporting parts may include a cut out portion at a location corresponding to the axis.

To assemble the needle threader member to the needle receiving member, when inserting the pivot provided on the one of the needle threader supporting parts into the needle receiving member, the cut out portion provided on the other of the needle threader supporting parts can avoid interference with the needle receiving member, which facilitates the assembling operation.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is an entire view of a needle thread passing device according to a first embodiment of the present invention in a storage state;

FIG. **2** is a lengthwise cross-sectional view of the needle thread passing device of FIG. **1** in a storage state;

FIG. **3** is an exploded perspective view of the inside of the needle thread passing device of FIG. **1**;

FIG. **4** is a lengthwise cross-sectional view of a main portion of the needle thread passing device of FIG. **1** at the time of use;

FIG. **5** is a lengthwise cross-sectional view of a main portion of the needle thread passing device of FIG. **1** at the time of use;

FIG. **6** is a lengthwise cross-sectional view of a main portion of the needle thread passing device of FIG. **1** at the time of use;

FIG. **7** shows a state where a thread has been inserted through a needle eye;

FIG. **8** is a lengthwise cross-sectional view showing a modification in which a unit different from the writing unit is integrated with the needle thread passing unit in the axial direction to constitute the needle thread passing device according to the present invention;

FIG. **9** is a lengthwise cross-sectional view showing another modification in which a unit different from the writing unit is integrated with the needle thread passing unit in the axial direction to constitute the needle thread passing device according to the present invention;

FIG. **10** is a lengthwise cross-sectional view of a needle thread passing device according to a second embodiment of the present invention in a storage state;

FIG. **11** is a cross-sectional view taken along the line **11-11** of FIG. **10**;

FIG. **12** is a lateral cross-sectional view taken along the line **12-12** of FIG. **11**;

FIG. **13** is a view showing the end surface of the needle thread passing device as viewed in the arrow **13** of FIG. **11**; and

FIG. **14** is a view showing a state where a dial is rotated from the position shown in FIG. **13**.

FIG. **15** is an entire view of a needle thread passing device according to a third embodiment of the present invention in a storage state;

FIG. **16** is an entire view of the needle thread passing device of FIG. **15** at the time of use;

FIG. **17** is a perspective view of a part of the needle thread passing device of FIG. **15**;

FIG. **18** is an exploded perspective view of a main portion of the needle thread passing device of FIG. **15**;

FIG. **19** is a lengthwise cross-sectional view of a main portion of the needle thread passing device of FIG. **15** at the time of use;

FIG. **20** is a lengthwise cross-sectional view of a main portion of the needle thread passing device of FIG. **15** at the time of use;

FIG. **21** is a perspective view of installation process of needle threader member of the needle thread passing device, FIG. **15** assembled to needle receiving member;

REFERENCE SIGNS LIST

10, **10'**, **100** needle thread passing device
12, **112** needle thread passing unit
14 writing unit (function unit)
30 main body
32, **132** cover (changeover member)
34, **34'**, **134** needle receiving member
34*c*, **134***c* needle insertion hole
34*e*, **134***e* thread insertion slit
40, **140** magnet
42, **142** needle threader member
48*b*, **148***b* needle threader pin
52 needle
52*a* needle eye
54 thread
60, **62** container (function unit)
90 housing space
144, **146** needle threader supporting parts
144*c* pivot
146*c* cut portion
152 protecting cover (protecting member)
152*d* small projections (notifying means)

DESCRIPTION OF EMBODIMENTS

Embodiments of the present invention will be described below with reference to the accompanying drawings.

FIG. **1** is an entire view of a needle thread passing device according to a first embodiment of the present invention in a storage state, FIG. **2** is a vertical cross-sectional view thereof in a storage time, and FIG. **3** is an exploded perspective view of the inside thereof.

As illustrated, a needle thread passing device **10** according to the first embodiment has an elongated cylindrical shape as a whole. The needle thread passing device **10** includes a needle threader unit **12** provided on one side of the needle thread passing device **10** and a writing unit **14** provided on the other side thereof. The needle thread passing unit **12** and the writing unit **14** are connected to each other in the axial direction to constitute the needle thread passing device **10**. The both units may be connected to each other by any suitable method, such as press fitting, bonding, screwing or like in a detachable or fixed manner. As a matter of course, the needle thread passing device **10** may be constituted only by the needle thread passing unit **12**. However, in this embodiment, a use of the writing unit **14** enables writing on fabrics.

The writing unit **14** includes a writing unit main body **20** constituting an ink tank, a relay core **22**, an adjuster **24** constructed in an comb-like shape for housing overflow ink, a tip element **26**, a pen point **28**, and a not-shown cap detachably attached to the pen point **28** so as to protect the same. The writing unit **14** may have any suitable configuration other than as illustrated or described herein.

The needle thread passing unit **12** includes a cylindrical main body **30** connected to the writing unit main body **20** of the writing unit **14** and a cover **32** which is a cylindrical changeover member covering the outside of the main body **30** and freely slidable in a predetermined range with respect to the main body **30** in the axial direction thereof. Elongated holes **30***a* and **32***a* are formed on the main body **30** and the cover **32**, respectively, at positions aligned in the circumferential direction thereof so as to extend from the end portions thereof in the axis direction.

In the following description, as a matter of convenience, the writing unit **14** side of the needle thread passing unit **12** is referred to as proximal side, and its opposite side is referred to as distal side.

A needle receiving member **34** is arranged in the main body **30** so as to extend from the distal end side thereof. As shown in FIG. **3**, the needle receiving member **34** is constituted by two needle receiving parts **36** and **38** which are substantially symmetric with respect to each other. A plurality of engagement projections **38***a* projecting from the needle receiving part **38** are fitted into a plurality of engagement holes **36***a* formed in the needle receiving part **36**, whereby the substantially cylindrical needle receiving member **34** provided in the main body **30** is constructed. The needle receiving member **34** is fixed by press fitting, engagement, bonding or like in the main body **30**.

Flange portions **36***b* and **38***b* are formed respectively at the distal ends of the needle receiving parts **36** and **38** so as to be abutted against the tip end surface of the main body **30**.

Elongated groove portions **36***c* and **38***c* are formed respectively on the opposed surfaces of the needle receiving parts **36** and **38** so as to extend from the distal side. In a state where the needle receiving parts **36** and **38** has been fitted to each other to constitute the needle receiving member **34**, the elongated groove portions **36***c* and **38***c* constitute a needle insertion hole **34***c* (see FIG. **2**) for receiving a needle.

Projecting portions **36***d* and **38***d* partly projecting outward in the circumferential direction are formed in the needle receiving parts **36** and **38**. In a state where the needle receiving parts **36** and **38** has fitted to each other to constitute the needle receiving member **34**, a slight gap is formed between the opposed surfaces of the projecting portions **36***d* and **38***d*. This gap extends to the inside in the radial direction so as to communicate with the needle insertion hole **34***c*. Further, the projecting portions **36***d* and **38***d* slightly project from the elongated holes **30***a* and **32***a* of the main body **30** and the cover **32** and are therefore exposed.

Slits **36***e* and **38***e* are formed so as to obliquely extend from exposed surfaces of the projecting portions **36***d* and **38***d*. The slits **36***e* and **38***e* extend from the exposed surfaces toward the proximal side and then extend in the direction perpendicular to the needle insertion hole **34***c* constituted by the elongated groove portions **36***c* and **38***c*. The slits **36***e* and **38***e* constitute a thread insertion slit **34***e*(see FIG. **2**). Housing grooves **36***f* and **38***f* are formed at the end portions, i.e., adjacent to the proximal end portions of the elongated groove portions **36***c* and **38***c*. The housing grooves **36***f* and **38***f* constitute a magnet housing portion **34***f* (see FIG. **2**). A magnet **40** is housed in the magnet housing portion **34***f*.

Concave portions **36***g* and **38***g* are formed in the needle receiving parts **36** and **38** so as to extend from the end portions of the elongated groove portions **36***c* and **38***c* in the direction perpendicular to the elongated groove portions **36***c* and **38***c* and in the direction opposite to the projecting portions **36***d* and **38***d*. In a state where the needle receiving parts **36** and **38** has been fitted to each other to constitute the needle receiving member **34**, the concave portions **36***g* and **38***g* constitute a thread pass hole **34***g* (see FIG. **2**).

Cut out portions **36***h* and **38***h* are formed on the proximal side relative to the projecting portions **36***d* and **38***d*. The cut out portions **36***h* and **38***h* are surrounded by thin plate-like portions **36***i* and **38***i*. Pivots **36***j* and **38***j* are formed so as to project from the proximal end portions of the plate-like portions **36***i* and **38***i*. Lower top portions **36***k* and **38***k* are formed on the top surface of the plate-like portions **36***i* and **38***i*. The heights of the lower top portions **36***k* and **38***k* are lower at the opposed side than at the opposite side. The lower top portions **36***k* and **38***k* constitute a spring receiving surface **34**K.

A needle threader member **42** is arranged so as to sandwich the plate-like portions **36***i* and **38***i*. The needle threader member **42** is constituted by two needle threader supporting parts **44** and **46** having substantially the same shape, a needle threader part **48** sandwiched by the needle threader supporting parts **44** and **46**, and a spring **50** serving as a biasing member. A plurality of engagement holes **48***a* formed in the needle threader part **48** and a plurality of engagement holes **46***a* formed in the needle threader supporting part **46** are fitted to a plurality of engagement projections **44***a* formed on the needle threader supporting part **44**, whereby the needle threader supporting parts **44** and **46** constitute the outer shape of the needle threader member **42** with the needle threader part **48** sandwiched therebetween. A needle threader pin **48***b* is formed at the needle threader part **48** so as to project from between the needle threader supporting parts **44** and **46**.

The spring **50** has one leg **50***a* and the other leg **50***b* forming an angle and is elastically deformable so as to allow the angle to be changed. The leg **50***a* of the spring **50** is arranged along a groove **44***b* formed in the needle threader supporting part **44** to be sandwiched between the needle threader supporting parts **44** and **46**.

Pivot receiving holes **44***c* and **46***c* are formed respectively in the needle threader supporting parts **44** and **46** which are pivotably fitted to the pivots **36***j* and **38***j* of the needle receiving parts **36** and **38**. Thus, the needle threader supporting parts **44** and **46** are arranged adjacent to the plate-like portions **36***i* and **38***i* of the needle receiving parts **36** and **38**, the needle threader part **48** and spring **50** are arranged in the cut out portions **36***h* and **38***h* of the needle receiving parts **36** and **38**,

and the leg **50***b* of the spring **50** is abutted against the spring receiving surface **34***k*. This arrangement allows the needle threader member **42** to be swingable about the pivots **36***j* and **38***j* with respect to the needle receiving member **34**. That is, the needle threader member **42** can move between the positions at which the tip end thereof is away from and close to the needle receiving member **34**. Further, in this arrangement, the tip end of the needle threader member **42** is biased by the spring **50** in the direction away from the needle receiving member **34**. When swinging, the needle threader member **42** can pass through the elongated hole **30***a* of the main body **30**.

Further, while the needle threader member **42** swings from a position at which the tip end thereof is away from the needle receiving member **34** to a position close to the same, the needle threader pin **48***b* of the needle threader part **48** can go into the gap formed between the opposed surfaces of the projecting portions **36***d* and **38***d* of the needle receiving parts **36** and **38** and pass through the proximal end portions of the elongated groove portions **36***c* and **38***c* constituting the needle insertion hole **34***c* so as to reach the concave portions **36***g* and **38***g* constituting the thread pass hole **34***g*, and can go back along the same route.

When the needle threader member **42** is brought close to the needle receiving member **34** to the maximum extent possible, against the biasing force of the spring **50**, projecting portions **44***d* and **46***d* formed at the distal ends of the needle threader supporting parts **44** and **46** so as to project in the radial direction and distal end direction are aligned with the projecting portions **36***d* and **38***d* of the needle receiving parts **36** and **38**.

At the time of nonuse, in the needle thread passing unit **12** having the above configuration, the cover **32** is located at a position (locking position) at which the same covers the proximal end portion of the elongated hole **30***a* of the main body **30** as shown in FIG. **2**. Thus, parts other than the projecting portions **44***d* and **46***d* of the needle threader supporting parts **44** and **46** constituting the needle threader member **42** are covered by the cover **32**. In this state, the biasing force of the spring **50** is intercepted by the cover **32**, so that the needle threader member **42** is locked at a position close to the needle receiving member **34** to be housed in the main body **30**, forming a cylindrical shape together with the needle receiving member **34**. Therefore, the needle thread passing unit **12** can be housed compactly in this state. At this time, the tip end of the needle threader pin **48***b* of the needle threader part **48** reaches the thread pass hole **34***g*, as shown in FIG. **2**.

At the time of use, the cover **32** is slid to a position (allowance position) on the proximal end side relative to the main body **30**. As a result, the needle threader member **42** goes out of the cover **32**, allowing the needle threader member **42** to swing outwardly by the biasing force of the spring **50** (FIG. **4**). Accordingly, the tip end of the needle threader pin **48***b* of the needle threader part **48** passes through the thread pass hole **34***g* and the needle insertion hole **34***c* and stops at the gap between the projecting portions **36***d* and **38***d*.

Then, as shown in FIG. **5**, a needle **52** is inserted into the needle insertion hole **34***c* with a needle eye **52***a* directed to the needle insertion hole **34***c*. When the needle **52** has been inserted into deeply into the needle insertion hole **34***c*, the needle **52** is attracted to the magnet **40** by the magnetic force thereof, so that the needle **52** can be fixed in place, thereby preventing dropping of the needle **52**.

Then, a thread **54** is inserted into the inside of the needle thread passing unit **12** through a thread insertion slit **34***e*. The position of the end portion of the thread insertion slit **34***e* is set corresponding to the position of the needle eye **52***a*. The end portion of the thread insertion slit **34***e* extends in the direction perpendicular to the needle insertion hole **34***c*. That is, it is sufficient for the thread **54** to reach the portion extending in the direction perpendicular to the needle insertion hole **34***c*, not necessarily reach just the end portion of the thread insertion slit **34***e*.

Then, when the needle threader member **42** is pressed so as to allow the same to swing such that the distal ends of the projecting portions **44***d* and **46***d* of the needle threader supporting parts **44** and **46** are brought close to the needle receiving member **34**, the tip end of the needle threader pin **48***b* of the needle threader part **48** passes through the needle eye **52***a* while pressing the thread and reaches the thread pass hole **34***g* as shown in FIG. **6**. When the pressing of the needle threader member **42** is released, the needle threader pin **48***b* goes out of the needle eye **52***a*, while a state where the thread **54** has been inserted through the needle eye **52***a* is kept.

When the needle **52** is taken out of the needle insertion hole **34***c*, a part of the thread **54** is kept inserted through the needle eye **52***a*. The thread that has been inserted through the needle eye **52***a* has a loop as shown in FIG. **7**, so that when the loop is made larger until the end of the thread **54** passes through the needle eye **52***a*, the loop is released, whereby the needle insertion operation is completed.

After the use, the needle threader member **42** is pressed to bring the distal ends of the projecting portions **44***d* and **46***d* of the needle threader supporting parts **44** and **46** close to the needle receiving member **34** and, after that, the cover **32** is moved to the locking position, whereby the needle threader can be made in a compact form once again.

As described above, according to the first embodiment of the present invention, its operation can be achieved with the needle threader in hand at the time of use, while at the time of nonuse, the needle thread passing device can be made in a compact form for easy storage.

FIGS. **8** and **9** each show a modification in which the needle thread passing unit **12** and a function unit different from the writing unit **14** are integrated in the axial direction to constitute the needle thread passing device **10**. In FIGS. **8** and **9**, containers **60** and **62** are used as the units to be integrated with the needle thread passing unit **12**. Although the containers **60** and **62** are each detachably connected to the main body **30** by screwing in these examples, the connecting method is not limited to this. The container **60** is formed by blow molding and the container **62** is formed by injection molding. A user can put various objects such as pills, threads, needles, or buttons in the container **60** or **62**. These objects can be taken out by removing the container **60** or **62** from the main body **30**.

FIGS. **10** to **14** are views showing a needle thread passing device according to a second embodiment of the present invention. A needle thread passing device **10'** in the present embodiment does not have a plurality of units but instead, integrally has a housing space inside the needle thread passing device. In the present embodiment, the same reference numerals as those in the first embodiment denote the same or corresponding parts as those in the first embodiment, and the descriptions thereof will be omitted here.

The needle threader passing device **10'** includes a cylindrical main body **30**, a cover **32** which is a cylindrical changeover member covering the outside of the main body **30** and freely slidable in a predetermined range with respect to the main body **30** in the axial direction thereof, a needle receiving member **34'**, a needle threader member **42**, a tail cap **84** which is inserted into the main body **30** from the proximal end side (rear side) and fixed therein, and a dial **86** which is rotatably attached to the tail cap **84**.

As shown in FIG. **11**, needle receiving parts **36'** and **38'** constituting the needle receiving member **34'** do not expand in the radial direction, but a gap is formed between the main body **30** and the needle receiving parts **36'** and 38', and a pair of wall surface portions **84***a* and **84***a* extending in the direction toward the tail cap **84** are arranged on both sides of the needle receiving member **34'**, whereby housing spaces **90** extending in the axial direction are defined between the wall surface portions **84***a* and the inner circumferential surface of the main body **30**.

The tail cap **84** and the needle receiving member **34'** may be fixed to the main body **30** by any suitable method such as engagement, fitting, press fitting, or like.

The tail cap **84** has a rear end surface portion **84***b* for closing the rear end of the main body **30**. The rear end surface portion **84***b* has a center hole **84***c* at its center and a flange portion **84***e* surrounding the periphery of the center hole **84***c*. The rear end surface portion **84***b* of the tail cap **84** further has a pair of insertion ports **84***d* and **84***d* which are eccentrically arranged from the center hole **84***c* so as to communicate with the housing spaces **90**.

The dial **86** is attached to the rear end surface portion **84***b* of the tail cap **84**. A boss portion **86***a* of the dial **86** is inserted into the center hole **84***c* of the tail cap **84** to be rotatably engaged with the tip end of the flange portion **84***e*. The dial **86** has, at a position eccentrically displaced from the center thereof, a window hole **86***b* which can be aligned with one of the insertion ports **84***d*.

In the needle threader passing device **10'** having the above configuration, it is possible to put the needle **52** and the like in the housing spaces **90** defined between the wall surface portions **84***a* of the tail cap **84** and the inner circumferential surface of the main body **30**. When the needle **52** and the like are put in or taken out, the dial **86** is rotated so as to align the window hole **86***b* of the dial **86** with one of the insertion holes **84***d* as shown in FIG. **13**, thereby allowing the needle **52** and the like to be put in or take out of the housing space **90**. When the dial **86** is rotated after the completion of pulling in or taking out the needle **52** and the like so as to move the window hole **86***b* to a position that is not aligned with the insertion holes **84***d* as shown in FIG. **14**, it is possible to prevent dropping of the needle **52** and the like put in the housing spaces **90**.

A procedure of inserting the thread through the needle eye is the same as in the needle thread passing unit **12** (FIGS. **4** to **6**).

According to the needle thread passing device **10'**, the housing spaces **90** are provided between the main body and needle receiving member, thereby achieving a needle thread passing device with high space efficiency and excellent portability/accommodation capability.

Further, the needle thread passing device is presented as FIG. **15** to FIG. **20** according to a third embodiment of the present invention.

The needle thread passing unit **112** of the needle thread passing device **100** in this embodiment of the present invention includes the cover **132** which is freely slidable with respect to the needle receiving member **134** and needle threader member **142** which is movable between positions away from and close to needle threader member **134**. It may be chosen if having the main body or not having the same. The needle receiving member **134** and the needle threader member **142** are respectively corresponding to the needle receiving member **34**, **34'** and the needle threader member **42** of the former embodiments.

The needle receiving member **134** includes two needle receiving parts **136**, **138** which are substantially symmetric with respect to each other, and also magnet **140**, protecting cover **152** and cutter **154**.

The needle receiving parts **136** and **138** correspond to the needle receiving parts **36** and **38**(**36'**, **38'**) of the former embodiments, and the both parts respectively include engagement projections **136***a*, engagement hole **138***a*, flange portion **136***b* and **138***b*, elongated groove portions **136***c* and **138***c*, projecting portions **136***d* and **138***d*, slit **136***e* and **138***e*, housing grooves **136***f* and **138***f*, concave portions **136***g* and **138***g*, cut out portions **136***h* and **138***h*, plate-like portions **136***i* and **138***i*, pivot receiving holes **136***j* and **138***j*, which respectively correspond to engagement hole **36***a*, engagement projections **38***a*, flange portion **36***b* and **38***b*, elongated groove portions **36***c* and **38***c*, projecting portions **36***d* and **38***d*, slit **36***e* and **38***e*, housing grooves **36***f* and **38***f*, concave portions **36***g* and **38***g*, cut portions **36***h* and **38***h*, plate-like portions **36***i* and **38***i*, pivots **36***j* and **38***j* of the former embodiments. This arrangement allows needle insertion hole **134***c* to be formed by the elongated groove portions **136***c* and **138***c*, thread insertion slit **134***e* to be formed by the slit **136***e* and **138***e*, magnet housing groove **134***f* to by formed by the housing groove **136***f* and **138***f*, thread pass hole **134***g* to be formed by the concave portions **136***g* and **138***g*.

The needle receiving parts **136** and **138**, which are different from the needle receiving parts **36** and **38**, have semi cylindrical projections **136***k* and **138***k* in the cut out portions **136***h* and **138***h*, and a spring receiving projection **134***k* is formed by these cylindrical projections **136***k* and **138***k*.

These needle receiving parts **136** and **138** respectively comprise second concave parts **136***m* and **138***m* at the opposite side of the concave parts **136***g* and **138***g* for installing the protecting cover **152** and third concave parts **136***n* and **138***n* at the same side of the concave parts **136***g* and **138***g* for housing the cutter **154** at the concave parts **136***g* and **138***g* as well as the construction of the needle receiving parts **36** and **38**.

The protecting cover **152** comprises a pair of legs **152***a* which are largely bent to be U-shaped, and head **152***b* which is slightly bent at the opposite side of the legs **152***a*, and a vertical elongated slit **152***c* is formed at the center of the head **152***b*. The legs **152***a* and **152***a* are attached to the needle receiving parts **136** and **138** so as to pivotably received in a pivoting receiving part formed on the second concave part **136***m* and **138***m* of the receiving parts **136** and **138**. The protecting cover **152** is elastically deformable. The bending end part of the head **152***b* has a small projection **152***b*.

While the protecting cover **152** is attached to the needle receiving parts **136** and **138**, a gap is formed between the head **152***b* of the protecting cover **152** and the needle receiving parts **136** and **138** so as to communicate with the thread insertion slit **134***e*. This gap and the thread insertion slit **134***e* are widen than the thread insertion slit **34***e* in the former embodiment in order to easily insert a thread.

A needle threader member **142** is arranged to sandwich the plate-like portions **136***i* and **138***i* and is constituted by two needle threader supporting parts **144** and **146** having substantially the same shape, and a needle threader part **148** sandwiched by the needle threader supporting parts **144** and **146**. A plurality of engagement holes **148***a* formed in the needle threader part **148** and a plurality of engagement holes **146***a* formed in the needle threader supporting part **146** are fitted to a plurality of engagement projections **144***a* formed on the needle threader supporting part **144**, whereby the needle threader supporting parts **144** and **146** constitute the outer shape of the needle threader member **142** with the needle threader part **148** sandwiched therebetween. A needle

threader pin **148***b* is formed at the needle threader part **148** projecting from the middle of the needle threader supporting parts **144** and **146**.

Pivot **144***c* is formed on one side of the needle threader supporting part **144** which is rotatably fitted to the pivot receiving holes **136***j* and **138***j* of the needle receiving parts **136** and **138**.

On the other hand, cut out portion **146***c* is formed in one of the needle threader supporting part **146** so as to correspond to the pivot **144***c* of the needle threader supporting part **144**. The spring **150** is inserted between the spring receiving projection **134***k* formed by the projections **136***k* and **138***k* of the needle receiving parts **136** and **138** and the spring receiving parts **144***b* and **146***b* formed in the needle threader supporting parts **144** and **146**. Further, falling out stopper lugs **144***e* and **146***e* are formed on the respective opposed faces of the needle threader receiving parts **144** and **146**.

When installing of the threader member **142** to the needle threader receiving member **134**, as shown in FIG. **21**(*a*), the pivot **144***c* of the thread passing part **144** is inserted into the pivot receiving holes **136***j* and **138***j* of the needle receiving parts **136** and **138** under the status that the threader member **142** is rotate by 90 degree relative to the needle receiving member **134**.

At this installation operation, the corresponding portion to the pivot **144***c* of the needle threader supporting parts **146** is the cut out portion **146***c*, which allows the needle receiving member **134** to pass through the cut out portion **146***c* and the insertion operation of the pivot **144***c* may be operated without interference of the needle threader supporting parts **146**. In the next step, the spring **150** is inserted between the needle threader member **142** and the needle receiving member **134** so as to be set between the spring receiving projection **134***k* and the spring receiving parts **144***b* and **146***b* (FIG. **21**(*b*)). Further, while the projections **144***d* and **146***d* are close to the needle receiving member **134** by swing the needle threader member **142**, the falling out stopper lugs **144***e* and **146***e* of the needle threader supporting parts **144** and **146** respectively pass over the falling out stopper lugs **136***p* and **138***p* formed on the plate-like portions **136***i* and **138***i* of the needle receiving parts **136** and **138**, thereby installing the needle threader member **142** to the needle receiving member **134**. The falling out stopper lugs **144***e* and **146***e* prevent excess swing of the needle threader member **142** by interfering with the falling out stopper lugs **136***p* and **138***p* once passing over the falling out stopper lugs **136***p* and **138***p* due to the elastic deformation of the needle threader supporting parts **144** and **146**.

Accordingly, the needle threader supporting parts **144** and **146** are close to the plate-like portions **136***i* and **138***i* of the needle receiving parts **136** and **138** and the needle threader part **148** and the spring **150** are arranged in the cut out portions **136***h* and **138***h* of the needle receiving parts **136** and **138**.

Thus, the needle threader supporting part **142** is allowed to swingable about the pivot receiving holes **136***j* and **138***j* with respect to the needle receiving member **134**, that is, the needle threader member **142** can move between the positions at which the tip end thereof is away from and close to the needle receiving member **134**. Further, in this arrangement, the tip end of the needle threader member **142** is biased by the spring **150** in the direction away from the needle receiving member **134**.

The needle threader pin **148***b* of the needle threader part **148** is inserted into the slit **152***c* of the protecting cover **152** and the surface of the both sides of the needle threader pin **148***b* is sandwiched by the slit **152***c*.

At the time of use, in the needle threader unit having the above configuration, while the cover **132** is slid to the needle receiving member **134** from the position as shown in FIG. **15** like the former embodiments, the needle threader member **142** is allowed to swing and goes into the status as shown in FIG. **16**. At this time, the needle threader pin **148***b* of the needle threader part **148** is in the slit **152***c* of the protecting cover **152** (FIG. **19**) and protected. The falling out stopper lugs **144***e* and **146***e* is about against the falling out stopper lugs **136***p* and **138***p*.

Then, the needle **52** is inserted into the needle insertion hole **134***c* with a needle eye **52***a* directed to the needle insertion hole **134***c*, and the thread **54** is inserted through the thread insertion slit **134***e*. Then, when the needle threader member **142** is pressed so as to allow the same to swing such that the tip ends **144***f* and **146***f* of the projecting parts **144***d* and **146***d* of the needle threader supporting parts **144** and **146** are brought close to the needle receiving member **134**, the tip end of the needle threader pin **148***b* of the needle threader part **148** passes through the needle eye **52***a* while pressing the thread and reaches the thread pass hole **134***g* as shown in FIG. **20**, enable the thread to pass through needle like the former embodiments.

When the needle threader member **142** swings, the needle threader pin **148***b* of the needle threader part **148** always passes through the inside of the slit **152***c* of the protecting cover **152**, which restricts displacement of the both sides of the needle threader pin **148***b* by the slit **152***c* so as to prevent breakage or bent of the thin needle threader pin **148***b*. The protecting cover **152** may deform when the projecting parts **144***d* and **146***d* of the needle threader member **142** is approaching the needle receiving member **134**, while protecting the needle threader pin **148***b*, so as not to prevent the needle threader member **142** from approaching the needle receiving member **134**, and further prevent the inserted thread from escaping by means of blocking the thread insertion slit **134***e*. Further, the protecting cover **152** may prevent other thread from being inserted into the thread insertion slit **134***e*.

The tip ends **144***f* and **146***f* of the projecting parts **144***d* and **146***d* of the needle threader supporting parts **144** and **146** make contact with the small projection **152***d* of the protecting cover **152** at the fixed timing, of when just before or just after the needle threader pin **148***b* passes through the needle eye **52***a* (that is the needle insertion hole **134***c*). Thus, a clicking feel or a sound may be provided with the users so as to notify the users of the completion of the threadering.

Further, a projection or the like other than this small projection **152***d* may be provided at an optional position so as to notify the users of the completion of the threadering.

The invention claimed is:

1. A needle threader passing device comprising:

a needle receiving member formed with a needle insertion hole and a thread insertion slit forming an angle with the needle insertion hole;

a needle threader member that is movable between positions away from and close to the needle receiving member and has a needle threader pin that can push a thread inserted through the thread insertion slit into an eye of a needle inserted into the needle insertion hole when the needle threader member moves from the position away from the needle receiving member to position close thereto; and

a changeover member that can move with respect to the needle receiving member,

wherein the needle threader member is constantly biased toward the position away from the needle receiving member,

wherein the changeover member can move between a locking position at which the needle threader member is locked to the position close to the needle receiving member and an allowable position at which the needle threader member is allowed to move between the positions away from and close to the needle receiving member, and

wherein the needle threader member can swing so as to allow the tip end thereof to move between the positions away from and close to the needle receiving member, and the changeover member comprises a cover that covers at least a part of the needle threader member at the locking position.

2. A needle threader passing device comprising:

a needle receiving member formed with a needle insertion hole and a thread insertion slit forming an angle with the needle insertion hole;

a needle threader member that is movable between positions away from and close to the needle receiving member and has a needle threader pin that can push a thread inserted through the thread insertion slit into an eye of a needle inserted into the needle insertion hole when the needle threader member moves from the position away from the needle receiving member to position close thereto; and

a changeover member that can move with respect to the needle receiving member,

wherein the needle threader member is constantly biased toward the position away from the needle receiving member,

wherein the changeover member can move between a locking position at which the needle threader member is locked to the position close to the needle receiving member and an allowable position at which the needle threader member is allowed to move between the positions away from and close to the needle receiving member, and

wherein the needle receiving member is arranged in a cylindrical main body, the changeover member can be slid on the outside of the main body, and at least a part of the needle threader member is arranged in the main body when located at the position close to the needle receiving member.

3. The needle threader passing device according to claim **2**, wherein a housing space is formed between the main body and needle receiving member.

4. A needle threader passing device comprising:

a needle receiving member formed with a needle insertion hole and a thread insertion slit forming an angle with the needle insertion hole;

a needle threader member that is movable between positions away from and close to the needle receiving member and has a needle threader pin that can push a thread inserted through the thread insertion slit into an eye of a needle inserted into the needle insertion hole when the needle threader member moves from the position away from the needle receiving member to position close thereto; and

a changeover member that can move with respect to the needle receiving member,

wherein the needle threader member is constantly biased toward the position away from the needle receiving member,

wherein the changeover member can move between a locking position at which the needle threader member is locked to the position close to the needle receiving member and an allowable position at which the needle threader member is allowed to move between the positions away from and close to the needle receiving member, and

wherein a magnet is arranged at the end portion of the needle insertion hole.

5. A needle threader passing device comprising:

a needle receiving member formed with a needle insertion hole and a thread insertion slit forming an angle with the needle insertion hole;

a needle threader member that is movable between positions away from and close to the needle receiving member and has a needle threader pin that can push a thread inserted through the thread insertion slit into an eye of a needle inserted into the needle insertion hole when the needle threader member moves from the position away from the needle receiving member to position close thereto; and

a changeover member that can move with respect to the needle receiving member,

wherein the needle threader member is constantly biased toward the position away from the needle receiving member,

wherein the changeover member can move between a locking position at which the needle threader member is locked to the position close to the needle receiving member and an allowable position at which the needle threader member is allowed to move between the positions away from and close to the needle receiving member, and

wherein the needle receiving member further includes a protecting member for guiding the movement of the needle threader pin.

6. The needle threader passing device according to claim **5**, wherein the protecting member is deformable while the needle threader member approaches the needle receiving member so as to allow approach of the needle threader member.

7. A needle threader passing device comprising:

a needle receiving member formed with a needle insertion hole and a thread insertion slit forming an angle with the needle insertion hole;

a needle threader member that is movable between positions away from and close to the needle receiving member and has a needle threader pin that can push a thread inserted through the thread insertion slit into an eye of a needle inserted into the needle insertion hole when the needle threader member moves from the position away from the needle receiving member to position close thereto; and

a changeover member that can move with respect to the needle receiving member,

wherein the needle threader member is constantly biased toward the position away from the needle receiving member,

wherein the changeover member can move between a locking position at which the needle threader member is locked to the position close to the needle receiving member and an allowable position at which the needle threader member is allowed to move between the positions away from and close to the needle receiving member, and

wherein a notifying means for generating a sound or friction force is provided between the needle receiving member and the needle threader member in response to the needle threader pin of the needle threader member passing through the needle insertion hole.

8. A needle threader passing device comprising:

a needle receiving member formed with a needle insertion hole and a thread insertion slit forming an angle with the needle insertion hole;

a needle threader member that is movable between positions away from and close to the needle receiving member and has a needle threader pin that can push a thread inserted through the thread insertion slit into an eye of a needle inserted into the needle insertion hole when the needle threader member moves from the position away from the needle receiving member to position close thereto; and

a changeover member that can move with respect to the needle receiving member,

wherein the needle threader member is constantly biased toward the position away from the needle receiving member,

wherein the changeover member can move between a locking position at which the needle threader member is locked to the position close to the needle receiving member and an allowable position at which the needle threader member is allowed to move between the positions away from and close to the needle receiving member, and

wherein the needle threader member comprises a pair of needle threader supporting parts and a needle threader part including the needle threader pin arranged between the pair of needle threader support parts, one of the pair of the thread supporting parts having an axis pivotally supported by the needle receiving member and the other of the pair of the thread supporting parts having a cut out portion at a location corresponding to the axis.

9. The needle threader passing device according to claim 1, wherein the needle receiving member is arranged in a cylindrical main body, the changeover member can be slid on the outside of the main body, and at least a part of the needle threader member is arranged in the main body when located at the position close to the needle receiving member.

10. The needle threader passing device according to claim 1, wherein a magnet is arranged at the end portion of the needle insertion hole.

11. The needle threader passing device according to claim 2, wherein a magnet is arranged at the end portion of the needle insertion hole.

12. The needle threader passing device according to claim 1, wherein the thread insertion slit extends from the outside surface of the needle receiving member in the direction inclined with respect to the needle insertion hole, and then extends toward the needle insertion hole in the direction perpendicular to the needle insertion hole.

13. The needle threader passing device according to claim 2, wherein the thread insertion slit extends from the outside surface of the needle receiving member in the direction inclined with respect to the needle insertion hole, and then extends toward the needle insertion hole in the direction perpendicular to the needle insertion hole.

14. The needle threader passing device according to claim 4, wherein the thread insertion slit extends from the outside surface of the needle receiving member in the direction inclined with respect to the needle insertion hole, and then extends toward the needle insertion hole in the direction perpendicular to the needle insertion hole.

15. The needle threader passing device according to claim 1, wherein the needle threader passing device is constructed by integrating a needle threader unit and a unit having a different function from that of the needle threader unit, the needle threader unit including the needle receiving member, the needle threader member, and the changeover member.

16. The needle threader passing device according to claim 2, wherein the needle threader passing device is constructed by integrating a needle threader unit and a unit having a different function from that of the needle threader unit, the needle threader unit including the needle receiving member, the needle threader member, and the changeover member.

17. The needle threader passing device according to claim 4, wherein the needle threader passing device is constructed by integrating a needle threader unit and a unit having a different function from that of the needle threader unit, the needle threader unit including the needle receiving member, the needle threader member, and the changeover member.

18. The needle threader passing device according to claim 5, wherein a notifying means for generating a sound or friction force is provided between the needle receiving member and the needle threader member in response to the needle threader pin of the needle threader member passing through the needle insertion hole.

19. The needle threader passing device according to claim 8, wherein a notifying means for generating a sound or friction force is provided between the needle receiving member and the needle threader member in response to the needle threader pin of the needle threader member passing through the needle insertion hole.

20. The needle threader passing device according to claim 5, wherein the needle threader member comprises a pair of needle threader supporting parts and a needle threader part including the needle threader pin arranged between the pair of needle threader support parts, one of the pair of the thread supporting parts having an axis pivotally supported by the needle receiving member and the other of the pair of the thread supporting parts having a cut out portion at a location corresponding to the axis.

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